8.2/33

$$\int_{-2}^{2} \ln(x+3)\,dx$$

Let $u = \ln(x+3)$ $\quad dv = dx$

$du = \frac{1}{x+3}\,dx \quad v = x$

$$= x\ln(x+3)\Big|_{-2}^{2} - \int_{-2}^{2} \frac{x}{x+3}\,dx$$

$$x+3\,\overline{)\,x}\quad 1,\quad \frac{-(x+3)}{-3}$$

$$= (2\ln 5 - (-2\ln 1)) - \int_{-2}^{2} 1 - \frac{3}{x+3}\,dx$$

$$= \ln 25 - x\Big|_{-2}^{2} - 3\ln|x+3|\Big|_{-2}^{2}$$

$$= \ln 25 - (2-(-2)) - (3\ln 5 - 3\ln|1|)$$

$$= \ln 25 - 4 - 3\ln 5$$

$$= \ln\frac{1}{5} - 4$$

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(34)

$$\int_0^{1/2} \sin^{-1}(x)\,dx$$

$$\int_0^{1/2} 1\cdot\sin^{-1}(x)\,dx$$

$u = \sin^{-1}(x)$ $\qquad dv = 1$

$du = \frac{1}{\sqrt{1-x^2}}$ $\qquad v = x$

$$uv - \int v\,du = x\sin^{-1}(x) - \underbrace{\int x\cdot(1-x^2)^{-1/2}\,dx}_{\int -\frac{1}{2}\cdot u^{-1/2}\,du}$$

$u = 1-x^2$

$du = -2x\,dx$

$\div -2 \quad \div -2$

$-\frac{1}{2}du = x\,dx$

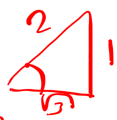
$$-\frac{1}{2}\int u^{-1/2}\,du = -\frac{1}{2}\cdot 2u^{1/2}$$

$$-\frac{1}{2}\cdot 2(1-x^2)^{1/2}$$

$$x\sin^{-1}(x) + \sqrt{1-x^2}\,\Big|_0^{1/2}$$

$$\frac{1}{2}\sin^{-1}\left(\frac{1}{2}\right) + \sqrt{1-\left(\frac{1}{2}\right)^2} - \left(0\cdot\sin^{-1}(0) + \sqrt{1-(0)^2}\right)$$

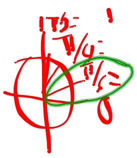
$\sin(x) = \frac{1}{2}$ $\qquad \frac{1}{2}\cdot\frac{\pi}{6} + \sqrt{1-\frac{1}{4}} - \sqrt{1}$



$1^2 + x^2 = 2^2$

$x^2 = 3$

$x = \sqrt{3}$



$$\boxed{\frac{\pi}{12} + \sqrt{\frac{3}{4}} - 1}$$

(35) $\int_2^4 \sec^{-1}(\sqrt{\theta})\,d\theta$

$u = \sec^{-1}(\sqrt{\theta})$

$du = \frac{1}{x\sqrt{x^2-1}} = \frac{1}{\sqrt{\theta}\sqrt{\theta-1}}\cdot\frac{1}{2\sqrt{\theta}}\,d\theta$

$\frac{1}{2\theta\sqrt{\theta-1}}\,d\theta$

$dv = 1\,d\theta \quad v=\theta$

$uv - \int v\,du$

$\sec^{-1}(\sqrt{\theta})\cdot\theta - \int \cancel{\theta}\cdot\frac{1}{2\cancel{\theta}\sqrt{\theta-1}}\,d\theta$

$\sec^{-1}(\sqrt{\theta})\cdot\theta - \frac{1}{2}\int\frac{1}{\sqrt{\theta-1}}\,d\theta$

$u=\theta-1$

$du=d\theta$

$\int\frac{1}{\sqrt{u}}\,du$

$\int u^{-1/2}\,du$

$2u^{1/2} = 2(\theta-1)^{1/2}$

$\theta\sec^{-1}(\sqrt{\theta}) - (\theta-1)^{1/2}$

$4\sec^{-1}(\sqrt{4}) - (4-1)^{1/2} - 2\sec^{-1}(\sqrt{2}) - (2-1)^{1/2}$

$\sec(x)=\sqrt{4}=2$

$\cancel{\frac{1}{\cos(x)} = \frac{2}{1}}$

$2\cos(x)=1$

$\div 2 \quad \div 2$

$\cos(x)=\frac{1}{2}$

$\pi/3$

$(4\cdot\frac{\pi}{3}-\sqrt{3})$

$\sec^{-1}(\sqrt{2})$

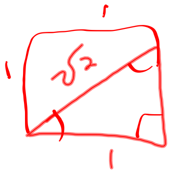
$\sec(x)=\sqrt{2}$

$\frac{1}{\cos(x)}=\frac{\sqrt{2}}{1}$

$\sqrt{2}\cos(x)=1$

$\div\sqrt{2} \quad \div\sqrt{2}$

$\cos(x)=\frac{1}{\sqrt{2}}$



Science

$(4\cdot\frac{\pi}{3}-\sqrt{3}) - (2\cdot\frac{\pi}{4}-\sqrt{2})$

$(\frac{4\pi}{3}-\sqrt{3}) - (\frac{\pi}{2}-\sqrt{2}) = \frac{4\pi}{3}-\sqrt{3}-\frac{\pi}{2}+\sqrt{2}$

I ♥ B3Y SWR

$\boxed{\frac{5\pi}{6}-\sqrt{3}+1}$

~~36~~

38

$$\int_0^{\pi} (x + x\cos(x))\,dx$$

$$\int_0^{\pi} x\,dx + \int_0^{\pi} x\cos(x)\,dx$$

$$\frac{x^2}{2}\Big|_0^{\pi} + \qquad u = x \qquad dv = \cos(x)$$

$$\frac{\pi^2}{2} - \frac{0^2}{2} = \frac{\pi^2}{2} + \qquad du = dx \qquad v = \sin(x)$$

$$uv - \int v\,du$$

$$x\sin(x) - \int \sin(x)\,dx$$

$$x\sin(x) + \cos(x)\Big|_0^{\pi}$$

$$\pi\sin(\pi) + \cos(\pi) - \cos(0)$$

$$0 - 1 - 1 = -2$$

$$\frac{\pi^2}{2} - 2$$

3

$y = 3x^{3/2} - 1$ $x = 0$ to $x = 1$

$y' = \frac{9x^{1/2}}{2}$ $\int_a^b \sqrt{1 + f'(x)^2}\, dx$

$\int_a^b \sqrt{1 + \left(\frac{9x^{1/2}}{2}\right)^2}\, dx$

$\int_a^b \sqrt{1 + \frac{81}{4}x}\, dx$

$1 + \frac{81}{4}x = u$ $\int_a^b \sqrt{u} \cdot \frac{4}{81}\, du$

$dx\frac{81}{4} = du$ $\frac{4}{81}\int_a^b u^{1/2}\, du$

$\div \frac{81}{4} \quad \div \frac{81}{4}$

$dx = \frac{4}{81}du$ $\frac{4}{81}\left(\frac{2u^{3/2}}{3}\right)\Big|_a^b$

$\begin{array}{r} 81 \\ \times\ 3 \\ \hline 243 \end{array}$

$\frac{8u^{3/2}}{243}\Big|_a^b = \frac{8\left(1 + \frac{81}{4}x\right)^{1/2}}{243}\Big|_0^1$

$\frac{8\sqrt{\frac{85}{4}}}{243} - \frac{8}{243} = \frac{8\frac{\sqrt{85}}{2}}{243} - \frac{8}{243}$

(4) $x = \frac{1}{3}(y^2+2)^{3/2}$ 0 to 1

$\frac{dx}{dy} = \frac{3}{6}(y^2+2)^{1/2} \cdot 2y = y(y^2+2)^{1/2}$

$\int \sqrt{1+\left(\frac{dx}{dy}\right)^2}\,dx = \int_a^b \sqrt{1+\left(y(y^2+2)^{1/2}\right)^2}\,dx$

$\int_0^1 \sqrt{1+y^2(y^2+2)}\,dx$

$\int_0^1 \sqrt{1+y^4+2y^2}\,dx$

$\int_0^1 \sqrt{(y^2+1)^2}\,dx$

$\int_0^1 y^2+1\,dx$

$\frac{y^3}{3}+y\Big|_0^1 = \frac{4}{3}$

(36) $\int_1^2 x\sec^{-1}(x)\,dx$

$\sec^{-1}$, $\frac{1}{\cos^{-1}}$ $u = \sec^{-1}(x)$ $dv = x$

$du = \frac{1}{x\sqrt{x^2-1}}dx$ $v = \frac{x^2}{2}$

$vu - \int v\,du$

$\frac{x^2}{2}\cdot\sec^{-1}(x) - \int \frac{x^2}{2}\cdot\frac{1}{x\sqrt{x^2-1}}dx$

$u = x^2-1$

$\frac{du}{2} = x\,dx$

$\int \frac{1}{2}\cdot\frac{1}{2}\cdot\frac{1}{\sqrt{u}}\,du$

$\frac{x^2}{2}\sec^{-1}(x) - \left(\frac{\sqrt{x^2-1}}{2}\right)$ $u^{-1/2+1}$ $\frac{\sqrt{u}}{2}$

$u = x^2-1$

$u = 3$

$u = 0$

$\frac{x^2}{2}\sec^{-1}(x) -$

$\frac{x^2}{2}\sec^{-1}(x)\Big|_1^2 - \frac{\sqrt{u}}{2}\Big|_0^3$

$\frac{4}{2}\sec^{-1}(2) - \frac{1}{2}\sec^{-1}(1)$

0 π

$\frac{1}{\cos^{-1}(x)} = \frac{2}{1}$

$2\cos^{-1}(x) =$

$\cos^{-1}(x) = \frac{1}{2}$

$\frac{\pi}{2} - \frac{\sqrt{u}}{2}\Big|_0^3$

$\frac{\pi}{2} - \left(\frac{\sqrt{3}}{2} - \frac{\sqrt{0}}{2}\right)$

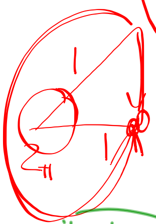
$\frac{\pi}{2} - \frac{\sqrt{3}}{2}$

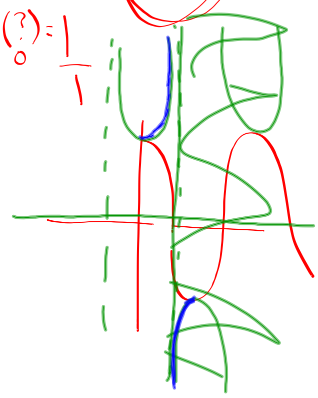
$\sec^{-1}(1) = ?$

$\sec(?) = 1$

$\frac{1}{\cos(?)} = \frac{1}{1}$

$\cos(?) = \frac{1}{1}$ 0





(6) $y = \dfrac{(x^6+8)}{16x^2}$

$= \dfrac{1}{16}x^4 + \dfrac{1}{2}\dfrac{1}{x^2}$

$y' = \dfrac{1}{4}x^3 - \dfrac{1}{x^3}$

$\dfrac{dy}{dx} = \dfrac{f'g + fg'}{g^2} = \dfrac{6x(16x^2) + (x^6+8)(32x)}{256x^4}$

$\dfrac{96x^2 + 32x^6 + 256x}{256x^4}$

$\dfrac{96x^2 + 32x^6 + 256}{256x^3}$

$\int_a^b \sqrt{1 + \left(\dfrac{96x^2+32x^6+256}{256x^3}\right)^2}\, dx$

$\int_a^b \sqrt{\left(\dfrac{96x^2+32x^6+256}{256\,x^3}\right)^2 + 1}\, dx$

$\dfrac{8}{3x} + \dfrac{x^3}{8} + \dfrac{1}{x^3}$

$256x^3 \overline{)\,96x^2 + 32x^6 + 256}$

$-96x^2$

$32x^6 + 256$

$32x^6$

256

256

0

$\left(\dfrac{8}{3x} + \dfrac{x^3}{8} + \dfrac{1}{x^3}\right)$

	$8/3x$	$x^3/8$	$1/x^3$
$8/3x$	$64/9x^2$	$\dfrac{x^2}{3}$	$\dfrac{8}{3x^4}$
$x^3/8$	$x^2/3$	$x^6/64$	$\dfrac{1}{8}$
$1/x^3$	$8/3x^4$	$1/8$	$1/x^6$

Jes

4 1 2 3 7

$\left(\dfrac{1}{4}x^3 - \dfrac{1}{x^3}\right)\left(\dfrac{1}{4}x^3 - \dfrac{1}{x^3}\right)$

$\dfrac{1}{16}x^6 - \dfrac{1}{4} - \dfrac{1}{4} + \dfrac{1}{x^6} \ldots$

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